

**Remarks**

Applicant thanks the Examiner for carefully considering the subject application.

Reconsideration of the application is hereby requested.

The typographical error in the Specification has been corrected according to the Examiner's instructions.

Claims 1-6, 9-14, and 17-26 were rejected under 35 U.S.C § 102(b) as being anticipated by Ricco et al. (U.S. Patent 5,532,526). Claims 1, 4, 5, 9, 12, 13, 17 and 23-26 were rejected under 35 U.S.C. § 102(e) as being anticipated by Gaessler et al. (U.S. Patent No. 6,772,737). In view of the foregoing amendments and following remarks, Applicant submits that these claims are in condition for allowance, and respectfully requests withdrawal of the rejections. Applicant also thanks the Examiner for indicating the allowable subject matter contained in claims 7, 8, 15 and 16.

Referring first to claim 23, that claim has been amended to recite that actuator energization and dissipation of freewheel current is "performed independently of any switching other than operation of the switch included in each of the plural valve actuator subsystems." Ricco et al. discloses plural actuator circuits 106, each including an actuator coil Li, switch SWi and a coupling diode Di. As discussed with reference to Figs. 3 and 4, the operation of the switch SWi in each actuator circuit 106 is not sufficient to enable the energizing of the actuators and circulation of freewheel current. Rather, the additional shared switch SWR, which is not part of any actuator circuit 106, is needed to energize the selected actuator and permit proper circulation of freewheel current. Accordingly, Ricco et al. does not anticipate amended claim 23.

Nor does Gaessler et al. anticipate amended claim 23. Unlike amended claim 23, Gaessler et al. does not disclose a system with plural actuator subsystems, let alone a plural

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actuator system having the switching feature discussed above with reference to the Ricco et al. reference. Accordingly, amended claim 23 is not anticipated by Gaessler et al.

Claims 24-26 depend from claim 23 and are thus allowable for at least the reasons stated above.

Referring now to independent claims 1, 9 and 17, and their dependent claims, Applicant respectfully disagrees with the rejections based on Ricco et al. and Gaessler et al. Independent claims 1, 9 and 17 vary in scope, though they all recite plural valve actuator subsystems coupled between a first voltage source and a second voltage source (claim 1 and 9), or between a power supply and an energy storage device (claim 17).

In each of independent claims 1, 9, 17, the recited plural valve actuator subsystems include two different configurations of valve actuator subsystems. In the first configuration, the first voltage source (or power supply) drives and energizes the actuator, and freewheel current from the actuator flows to and charges the second voltage source (or energy storage device). The second configuration works in an opposite manner: the second voltage source (or energy storage device) drives the actuator, and freewheel current is dumped into and stored at the first voltage source (or power supply). As discussed at length in the specification, the different configurations of actuator subsystems allow a low-loss method of capturing freewheel current with a simple switching method and a minimum of components.

Ricco et al. does not disclose actuator subsystems having different configurations.

Unlike the systems recited in claims 1, 9 and 17, the multiple actuator circuits 106 of Ricco et al. (Fig. 2) are identical in structure and function. As a result, the Ricco et al. system requires more components, must use a more complicated switching method to control freewheel behavior and suffers from higher dissipation losses. Actuator circuits 106 are not connected between a first

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voltage source and a second voltage source, or between a power supply and an energy storage device. Instead, each actuator circuit 106 is connected between battery B and its own separate capacitor  $C_i$ , thus requiring more components than the present invention.

In addition, freewheel current in the Ricco et al. system never flows to battery B. Instead, freewheel current is either dumped onto capacitor  $C_i$  (when switch SWR is open) or simply dissipates by circulating through actuator  $L_i$ , diode  $D_i$ , switch SWR and diode D1 (when switch SWR is closed). The Ricco et al. system thus involves more complicated switching and higher losses. Also, diode D2 prevents freewheel current from ever being dumped into and stored at battery B.

Gaessler et al. does not disclose multiple actuator subsystems, and thus necessarily does not disclose or suggest multiple actuator subsystems that vary in structure and/or function.

Furthermore, unlike the systems recited in claims 1, 9 and 17, neither Ricco et al. nor Gaessler et al. disclose a multiple-actuator system where actuator current can flow toward either of the voltage sources across which the actuators are coupled. As discussed above, Gaessler et al. does not disclose a multiple-actuator system. In Ricco et al., as discussed above, actuator current never flows toward battery B (Fig. 2) during freewheeling. Instead, as discussed at col. 4, lines 31-39, freewheel current from the actuator flows through the actuator coil and components  $D_i$ , SWR and D1. Diode D2 prevents freewheel current from flowing toward battery B.

Because neither Ricco et al. nor Gaessler et al. teach each and every limitation of claims 1, 9 and 17, those claims are not anticipated and Applicant respectfully requests withdrawal of the rejections of those claims. Dependent claims 2-6, 10-14 and 18-22 are allowable for at least the reasons stated above, and the rejections of those claims should similarly be withdrawn.

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Based on the foregoing comments, the above-identified application is believed to be in condition for allowance, and such allowance is courteously solicited. If any further amendment is necessary to advance prosecution and place this case in allowable condition, the Examiner is courteously requested to contact the undersigned by fax or telephone at the number listed below.

Please charge any cost incurred in the filing of this Amendment, along with any other costs, to Deposit Account No. 06-1510. If there are insufficient funds in this account, please charge the fees to Deposit Account No. 06-1505. A duplicate copy of this sheet is enclosed.

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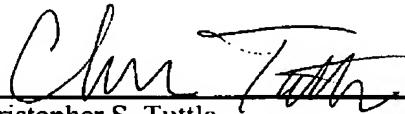
I hereby certify that this correspondence is being sent via facsimile to the U.S. Patent and Trademark Office at (703) 872-9306 on January 31, 2005.



Lauren Barberena

Respectfully submitted,

KOLISCH HARTWELL, P.C.



Christopher S. Tuttle  
Registration No. 41,357  
Customer PTO No. 36865  
of Attorney for Applicant  
520 S.W. Yamhill, Suite 200  
Portland, Oregon 97204  
Telephone: (503) 224-6655  
Facsimile: (503) 295-6679